

California Integrated Waste Management Board
Session Summary:
Emerging Technology Forum
April 17-18, 2006
Breakout Session 2B. Feedstocks and Products

The purpose of this session was to provide attendees with detailed information regarding the various potential material feedstocks and energy or other products from different types of conversion technologies.

Brief summary of presentation by Rob Williams prepared by CIWMB staff

Rob Williams is a Research Engineer in the Department of Biological and Agricultural Engineering at University of California, Davis. He is also a staff member for the California Biomass Collaborative. Mr. Williams' presentation was entitled, "Resource Potential of California Landfill Stream (and some options to pursue).

Mr. Williams began by stating that using the data from the California Integrated Waste Management Board's 2004 Waste Characterization and Disposal Amounts, he identified 59 percent of the total municipal solid waste disposed, or 25.7 million tons, as biomass components. He identified another 13.2 percent, or 5.7 million tons as non-renewable carbon compounds, such as non-film plastic, film plastic, and textiles; and 28 percent, or 12.1 million tons as inorganic. He said the energy potential from the biomass components was 44 million barrels of oil, or 1750 megawatts of electricity with another 23 million barrels of oil for plastics and textiles components, or 914 megawatts of electricity.

When discussing the feedstocks for the three major conversion technologies, Mr. Williams observed that thermochemical processes can accept nearly all organic material (biomass and plastics); biochemical processes can convert only biodegradable materials, such as food wastes, paper/cardboard, and wood waste; and biodegradation varies in rate and degree, and lignin fraction does not degrade anaerobically. He discussed anaerobic decomposition in greater detail, including hydrolysis and fermentation. He noted that under ideal circumstances, the mass yield of ethanol from fermentation after hydrolysis is 51 percent of the mass input of carbohydrate; he said the best yield in practical systems is approximately 46 percent. He provided a listing of the biomethane potential of some anaerobic digestion feedstocks, ranging from a high of 16,024 BTU/lb input of methane gas generated from vegetable oil, to a low of 1,123 BTU/lb input of methane gas generated from leaves.

Mr. Williams said California's per capita landfill disposal is a third more than the US average and more than twice that of Western Europe. He added that total annual landfill disposal is expected to increase as the population grows. He recommended implementing policies and technologies that can reduce per capita waste disposal in place of a diversion based approach. He asked, "Why not implement a landfill 'cap and trade' policy?" He said energy and solid waste policies in Europe have advanced the state of technology for waste management and conversion, and there are potential opportunities to adapt these policies and advanced systems in Europe to the emerging market in California. He noted Europe classifies all thermal conversion systems as 'incineration' because they have set strict environmental performance standards, rather than prescribed technologies, thermal conversion in Europe is a significant component of their strategies to reduce landfill disposal and green house

gas emissions. He said there is need for a comprehensive lifecycle analysis of integrated waste management in California that includes the full range of waste management techniques and strategies, including composting and the various conventional recycling methods, and emissions and conditions of recycling processes overseas that receive California's waste. He concluded his presentation by recommending the need to address and reaffirm or vacate 'legacy decisions' that led to material's 'highest and best use' and the waste hierarchy (i.e., AB 939).

Brief summary of presentation by Ladi Asgill provided by presenter

Ladi Asgill is a Project Manager for Sustainable Conservation, a company that advances the stewardship of natural resources using innovative, pragmatic strategies that actively engage businesses and private landowners in conservation.

Agricultural Feedstock for Renewable Energy Technologies

There are numerous benefits to be derived from sustainably integrating a biofuels into California's agricultural production systems. Biofuel production and use can help offset the severe air emissions resulting from transportation fuels, improve the economy of rural communities with some of the highest poverty rates, and promote energy security.

Energy production can be integrated into the dairy industry by the anaerobic digestion of some 65 billion pounds of manure produced annually for biomethane production. Biomethane can be used to fuel a significant percentage of natural gas vehicles and generate electrical power. Utilizing this wasted resource can also help prevent groundwater contamination.

California is unlikely to sustainably produce ethanol from cereal grains because of high production costs. The future of ethanol production in California is hinged on newer technologies involving cellulosic conversion of crop residues.

Petroleum diesel emission is recognized as a major toxic air contaminant. The use of varying blends of biodiesel and petroleum diesel result in significant reduction of harmful air emissions. Cottonseed and Canola are promising oilseeds that can be integrated into an emerging biodiesel without disrupting the primary agricultural crop production.

There is no perfect solution to address our renewable energy needs. Biofuels can be an important part of California's energy future. Agriculture and environmentalist will need to work together to chart solutions that protect the environment and guarantee our energy security.

Brief summary of presentation by Nancy Carr prepared by CIWMB Staff

Nancy Carr is with the California Integrated Waste Management Board's Waste Analysis Branch. She is primarily responsible for managing the statewide waste characterization studies, which are conducted about every three years.

Ms. Carr presented the findings from the 2003 Statewide Waste Characterization Study. She said the objectives of the study were to quantify the types and amount of materials disposed in California, looking at commercial, residential, and self-hauled sources. She noted the following material types not previously quantified were examined as part of the study: electronic items and certain plastic films.

Ms. Carr said 40.2 million tons of municipal solid waste was disposed in 2003. Of this, 30 percent was organic, 21.7 percent construction and demolition debris, and 21 percent paper. She said that despite all of the waste prevention, reuse, recycling and composting efforts, there hasn't been much change since the 1999 study. She noted that the top ten disposed materials in 2003 included the following organics: food (14.6 percent), lumber (9.6 percent), leaves and grass (4.2 percent), and remainder/composite organics (4.4 percent), which were listed in the top ten in 1999. For purposes of the Forum, she reshuffled the organics category by deleting carpet and textiles, and adding lumber. This resulted in the following breakdown of tons disposed in the "modified" organics category: food (5.9 million tons), leaves and grass (1.7 million tons), prunings and trimmings (920,000 tons), branches and stumps (120,000 tons), manures (37,000 tons), and lumber (3.9 million tons); a total of 12.5 million tons that could be used by conversion technologies.

Ms. Carr concluded her presentation by announcing that a new study on the characterization and quantification of residuals from material recovery facilities (MRFs) should be out this summer, 2006. She said the study would have data for four MRF types: single-stream processing, multi-stream processing, MSW processing, and C&D material processing.